SMALL NAVIGATION PROJECT

LAGOON POND
MARTHA'S VINEYARD
MASSACHUSETTS

DETAILED PROJECT REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

MAY 1968

~~(ADVANCE DRAFT)~~
FINAL

NEDED-R (13 May 68) 2d Ind
SUBJECT: Detailed Project Report for Small Navigation Project, Lagoon Pond, Martha's Vineyard, Massachusetts

DA, New England Div., Corps of Engrs, Waltham, Mass. 02154 26 Sept. 1968

TO: Chief of Engineers, ATTN: ENGCW-PD

1. Revisions, in accordance with directives in 1st Indorsement, have been made and are shown on pages iii, 3, 4, 4a, 8, 8a, 10, 11, 12, 13, 14, 15, 16, 16a, 18, and 21. Four sets of these revised pages (marked R/9/68) are inclosed.

2. In accordance with ER 1165-2-14, paragraph 14 (5), there are inclosed four (4) sets each of the 1st and 2d Indorsements, and copies of the Governor's comments to complete the project report.

Incl
As (4 cys each)

F. R. DAY
Colonel, Corps of Engineers
Acting Division Engineer

ENGCW-PD (13 May 68) 1st Ind
SUBJECT: Detailed Project Report for Small Navigation Project, Lagoon Pond, Martha's Vineyard, Massachusetts

DA, CofEngrs, Washington, D. C. 20315 3 July 1968

TO: Division Engineer, New England

1. It is requested that the following additions and revisions be included in the final report.

a. Full description of design criteria consideration to include wave climate of the area, design wave, littoral drift rate, estimated time for filling of extended jetty, and other criteria for design of jetty extension.

b. It appears that a slight westward reorientation of the jetty extension, making it more nearly normal to the -8' contour would accomplish the same purpose with somewhat less jetty length. Discuss the basis for selection of the proposed alinement.

c. Paragraph 37 (shoreline changes) should provide information on existing conditions. Presumably the existing jetty caused shoreline accretion to the east, but no adverse effect on the shore to the west. The proposed extension would be expected to have similar effects. Placing dredged material east of the jetty would probably reduce the time required to fill the extension to its capacity. It might be advisable to dispose of dredged material elsewhere than east of the jetty. The impounding capacity of the jetty, if conserved, would increase the effectiveness of the jetty in preventing shoaling of the channel.

d. Describe other existing navigation projects on Martha's Vineyard, (Federal and Non-Federal) and discuss their relationship to the proposed improvement.

e. Table IV. The total depreciated values (5th column) are not the product of the number of boats and their average value, as computed in the other tables. This results in a benefit about $1,800 too high and is probably based on the total fleet expansion of 77 boats.

f. The unit cost of $3 per c.y. for the small quantity of maintenance dredging without contingencies, etc., should be reviewed as it appears low compared to $3 per c.y. plus contingencies,etc., for the larger quantity of initial dredging.

2. The comments of the Governor of Massachusetts may be obtained and included in the final report, revised per above. Action regarding project approval and financing of plans of specifications will be taken after receipt and review of the final report.

FOR THE CHIEF OF ENGINEERS:

R. L. Seidel

Incl (USC)
wd 4 cys

R. L. SEIDEL
Colonel, Corps of Engineers
Assistant Director of Civil Works
for Atlantic Divisions

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

IN REPLY REFER TO:
NEDED-R

13 May 1968

SUBJECT: Detailed Project Report for Small Navigation Project, Lagoon Pond, Martha's Vineyard, Massachusetts

Chief of Engineers
ATTN: ENGCW-PD

1. In accordance with ER 1165-2-14, there are submitted for review and comment twelve copies of an advance draft of the subject report.

2. Responsible officials of the Commonwealth of Massachusetts and the Town of Tisbury concur in the recommended project and have given firm indications that the requirements of local cooperation would be met. Formal assurances of participation will be obtained from the Commonwealth and the Town during preparation of final design of the project.

3. The plans and specifications will be prepared in accordance with the Detailed Project Report as approved. Funds in the amount of $5,000 for preparation of the plans and specifications and $75,000 for the Federal share of construction will be required. The local share will be $80,000 or 50% of the estimated project cost.

4. Formal comments of the Governor of Massachusetts will be requested after approval of the advance draft.

Incl
as (12 cys)

REMI O. RENIER
Colonel, Corps of Engineers
Division Engineer

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

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DETAILED PROJECT REPORT
SMALL NAVIGATION PROJECT

LAGOON POND, TISBURY, MARTHA'S VINEYARD, MASSACHUSETTS

Pertinent Data

1. Purpose. To provide an access channel of sufficient depth and width to naturally deep anchorage areas in Lagoon Pond and thus alleviate overcrowded conditions in Vineyard Haven Harbor. This would allow for expansion of the recreational boating fleet in the area of Martha's Vineyard.

2. Location. The north shore of Martha's Vineyard, an island 3 miles off the southern coast of Cape Cod, Massachusetts.

3. Existing Project. There is no existing project at Lagoon Pond. A Federal project exists immediately to the west of the Lagoon Pond entrance in Vineyard Haven Harbor. It provides for a fairway 17 feet deep from the State breakwater to the ferry wharf at the head of the harbor, and an anchorage area of 12 acres, 12 feet deep, behind the State-owned breakwater.

4. Improvements Desired.

a. Enlargement of Federal anchorage behind the State breakwater in Vineyard Haven Harbor.

b. A channel to the ferry wharf in Vineyard Haven dredged to a depth of 17 feet below mean low water.

c. A channel 8 to 10 feet deep from Vineyard Haven Harbor into Lagoon Pond.

d. Extension of the existing jetty at Lagoon Pond entrance to deep water.

5. Recommended Improvement. Dredging an entrance channel 8 feet deep and 100 feet wide, and extending the existing jetty by 200 feet.

6. Estimated Costs.

Dredging 8-foot channel	
19,000 c. y. of ordinary material	
@ $3.00/c. y.	$57,000
Structures	
Jetty extension -	
4,500 tons @ $13/ton	58,500
Contingencies	17,500
Engineering & Design	13,000
Supervision & Administration	14,000
	$160,000*

*Excludes $18,200 for project study cost.

7. Apportionment of First Cost. Cost apportioned as 50% Federal and 50% non-Federal in accordance with proportion of general and local benefits to total benefits.

Federal Cost:

Corps of Engineers	$80,000
Aids to Navigation	
(U. S. Coast Guard)	None required
Total Federal Cost	$80,000

Non-Federal Cost:

Cash contribution	$80,000
Public Landing	10,000*
Total Non-Federal	$90,000

*Self-liquidating

8. Annual Costs

Federal Annual Charges

Interest & Amortization (0.04073 x $80,000)	$ 3,250
Maintenance:	
Channel	3,250
Jetty	1,000
	$ 7,500

Non-Federal Annual Charges

Interest & Amortization (0.04073 x $80,000)	$ 3,250
Total Annual Charges	$10,750

9. Benefits. Benefits are expected to accrue to recreational boating in the amount of $25,300 annually.

10. Benefit-Cost Ratio. 2.4 to 1.0.

11. Requirements of Local Cooperation.

a. Contribute 50% of the first cost of the Federal project.

b. Assume full responsibility for all project costs in excess of the $500,000 Corps of Engineers' limitation under Section 107 of the 1960 River and Harbor Act, as amended in 1965.

c. Provide, maintain and operate without cost to the United States a public landing with berths commensurate with the channel depth, and provide and maintain necessary access roads, parking areas and other public use facilities open to all on equal terms.

d. Hold and save the United States free from all damages which may result from the construction and subsequent maintenance of the project.

e. Provide without cost to the United States all lands, easements and rights-of-way required for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the public interest for initial and subsequent disposal of spoil, and also necessary retaining dikes, bulkheads and embankments therefor or the cost of such retaining works.

f. Regulate the use, growth and development of the harbor facilities with the understanding that they will be open to all on equal terms.

g. Establish regulations prohibiting discharge of untreated sewage, garbage and other pollutants in the waters of Lagoon Pond by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and Local authorities responsible for pollution prevention and control.

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LAGOON POND, TISBURY, MARTHA'S VINEYARD, MASSACHUSETTS

AUTHORITY

1. This Detailed Project Report is submitted pursuant to authority of Section 107 of the 1960 River and Harbor Act, as amended in 1965. Request for this study was made by the Board of Selectmen, Town of Tisbury, Martha's Vineyard, Massachusetts, by letter dated 12 September 1963. Specific authorization to investigate the possibility of developing a small navigation project at Lagoon Pond was provided by indorsements dated 18 November 1963 and 18 February 1966.

PURPOSE AND EXTENT OF STUDY

2. Detailed engineering and economic studies were undertaken to determine whether a Federal navigation project at Lagoon Pond was feasible and economically justifiable. Data on the use of nearby Vineyard Haven Harbor was studied to determine the adequacy of present facilities and the need for improving the Lagoon Pond entrance. Hydrographic surveys, including soundings, probings and borings, provided information as to the character and quantities of materials to be dredged. Use was also made of past hydrographic surveys made by the Commonwealth of Massachusetts in connection with its improvement studies at Lagoon Pond. Additional information was obtained from local and State officials, other Federal agencies and as a result of a public hearing held in Tisbury on 26 May 1964. Available maps, charts and aerial photographs were studied and field trips were made to observe present conditions in the harbor. Local, State and other Federal agencies were consulted during the study and their views are included in this report.

DESCRIPTION

3. Lagoon Pond is a tidal lagoon located at the northern end of Martha's Vineyard, an island 3 miles off the southern coast of the Cape Cod peninsula. The pond is two miles long, over one-third of a mile wide and is separated from Vineyard Haven Harbor by a narrow sandspit that serves as a connecting road between the Towns of Oak Bluffs and Tisbury. The natural inlet to Lagoon Pond cuts through the sandspit some 4,000 feet northeast of the head of Vineyard Haven Harbor. Depths in the main body of the pond range from 16 to 27 feet below mean low water. The mean tidal range is 1.7 feet and the spring tidal range 2.0 feet. Predominant winds are from the southwest, although winds with the highest velocities, excepting hurricanes, are generally from the north-northeast.

TRIBUTARY AREA

4. Martha's Vineyard is an island 20 miles long from east to west and 10 miles wide from north to south. The nearest point on the mainland is Woods Hole, Massachusetts, 3 miles distant to the north. The island is 80 miles from Boston, and 35 miles from New Bedford.

5. First settled in 1671, Martha's Vineyard figures prominently in the whaling and merchant trade of the 18th century. At the peak of the whaling industry, the largest sperm-oil candle factory in the world was located on the island. In the early days, there were also salt works and land cultivation. Today, the wholesale and retail trade industry accounts for the largest source of employment, especially during the summer months, indicating that the principal source of income is from the summer tourist trade. Easily accessible from the mainland by boat and aircraft, the island is a popular summer resort area. The New Bedford, Woods Hole, Martha's Vineyard and Nantucket Steamship Authority offers passenger and freight service daily between Woods Hole, Falmouth and Vineyard Haven, Martha's Vineyard. In addition, during the summer season, some passengers and freight are carried to the island by charter vessels operating from various ports on the mainland.

6. The Martha's Vineyard Airport is located four miles south of Vineyard Haven in Tisbury. Northeast Airlines provides

regularly scheduled daily flights from Boston, New York City, New Bedford, and Hyannis.

7. The island is divided into 6 towns; namely, Chilmark, Edgartown, Gay Head, Oak Bluffs, Tisbury and West Tisbury. The permanent population has grown since 1930 from 4, 953 to 5, 829 (1960). During the summer months, the population increases to 45, 000. Much of the service facilities to the island is provided through Vineyard Haven Harbor which is the most extensively developed harbor on the island.

BRIDGES AFFECTING NAVIGATION

8. The only bridge spanning the waterway under consideration is the Vineyard Haven-Oak Bluffs highway bridge. It is a timber pile concrete slab bascule structure with a horizontal clearance of 30 feet and a vertical clearance of 15 feet when closed. The bridge was constructed by the Commonwealth of Massachusetts in 1935 at a cost of $100, 000.

PRIOR REPORTS

9. A previous report, printed as House Document No. 65, 74th Congress, 1st Session, 1935, considered navigation improvements at Vineyard Haven Harbor and at the entrance to Lagoon Pond. The report recommended dredging an anchorage 12 feet deep behind the existing State breakwater at Vineyard Haven Harbor and providing a fairway in the inner harbor to the steamboat wharf to a depth of 17 feet. Improvement of the Lagoon Pond entrance was not recommended because of a lack of sufficient benefits.

EXISTING CORPS OF ENGINEERS PROJECT

10. a. There is no existing Federal project at Lagoon Pond. The nearest Federal project is immediately west of the Lagoon Pond entrance at Vineyard Haven Harbor. Adopted in 1935, the project provides for a fairway 17 feet deep from the steamboat wharf at the head of the harbor to the State breakwater and an anchorage area 12 feet deep behind the breakwater. In 1964, except for some minor shoaling, controlling depths were 17 feet in the fairway and 12 feet in the anchorage.

10.b. Other Corps of Engineers navigation projects on Martha's Vineyard are located at Menemsha Creek on the western end of the island and at Edgartown on the eastern end of the island, 12 miles and 8 miles by water from Vineyard Haven, respectively. The Menemsha Creek project provides for a 10-foot deep entrance channel stabilized by two State jetties leading into 10-foot and 6-foot anchorages just inside the east jetty and an 8-foot deep channel continuing on for a distance of 1.1 miles into deep water of Menemsha Pond. The Edgartown Harbor project provides for a channel 17 feet deep, 150 feet wide from Nantucket Sound into deep water of the inner harbor and the removal of shoals in the inner harbor to a depth of 12 feet. Both of these projects have little influence on the need for harbor improvement at Lagoon Pond because of their remoteness from the proposed project site.

OTHER IMPROVEMENTS

11.a. Improvements to the Lagoon Pond entrance have been made by the Commonwealth of Massachusetts in cooperation with the Towns of Tisbury and Oak Bluffs. The improvements consisted of a short jetty on the east side of the pond entrance and a 6-foot channel parallel to the jetty through the sandspit into Lagoon Pond. In vineyard Haven Harbor, the Commonwealth also constructed a breakwater 1,200 feet southeasterly from a point near the western shore of the harbor. All of the work was completed in 1935. More recently, the Commonwealth has constructed an access ramp with parking facilities adjacent to Lagoon Pond. The location of the ramp is off Beach Road, 1,000 feet southwest of the pond entrance.

11.b. Other locations improved for navigation by the Commonwealth of Massachusetts on Martha's Vineyard are as follows:

Location	Type of Improvement	Distance from Lagoon Pond
Tashmoo Pond	Channel dredging and jetty construction	5 miles
Menemsha Harbor	Marina development	12 miles
Farm Pond	Jetty construction	3 miles
Sengekontacket Pond	Jetty construction	4 miles
Oak Bluffs Harbor	Jetties, bulkheads, and dredging	2.5 miles

Navigation at Farm Pond and Sengekontacket Pond is restricted by fixed highway bridges at low levels which make them inaccessible as mooring areas for larger craft used for offshore cruising. Oak Bluffs Harbor is very small with limited anchorage and docking space for boats of all sizes.

TERMINAL AND TRANSFER FACILITIES

12. With the exception of two boatyards located at its north end, Lagoon Pond is practically without terminal facilities. Most of the terminals servicing the Tisbury-Oak Bluffs area as well as the rest of the island are located at the southeast end of Vineyard Haven Harbor near the developed community of Vineyard Haven. In Vineyard Haven Harbor, there are 5 boatyards, 2 oil terminals, a town pier, a yacht club, and a ferry terminal. In recent years, the harbor has experienced a rapid growth in recreational boating. Over 500 craft are permanently based in the harbor. A natural stopover for boats plying the waters of Nantucket Sound, it attracts 4,000 transient craft each year.

13. By contrast, the fishing fleet is small, consisting of three 35-foot lobster boats and one 40-foot trawler. Most of the commercial fish catch is landed in New Bedford or other mainland ports. Scallop and quahog shellfishing, mainly by rowboats, is extensive in Lagoon Pond.

IMPROVEMENTS DESIRED

14. At the public hearing, local interests presented a desired plan of improvement that would provide for:

a. Enlargement of the Federal anchorage area behind the existing State breakwater in Vineyard Haven Harbor dredged to a depth of 12 feet mean low water.

b. A channel to the ferry wharf dredged to 17 feet below mean low water.

c. A channel 8 to 10 feet deep from Vineyard Haven Harbor into Lagoon Pond--a distance of about one-third mile.

d. Extension of the present State jetty at the Lagoon Pond entrance in a northeasterly direction to deep water (15 to 20 feet at m. l. w.).

15. The majority of those who spoke at the public hearing were in favor of the improvements. Several citizens, however, expressed opposition to any marina development in the pond for fear that the pond would be polluted. The Director of the State Lobster Hatcheries and Research Station in Martha's Vineyard expressed concern about possible silting and pollution in the area where the Commonwealth is conducting lobster and other shellfish research. The Director expressed an opinion that there would be no problem if dredging were confined to the entrance to the pond and if the dredging were accomplished in months other than May, June, July and August.

EXISTING AND PROSPECTIVE COMMERCE

16. There is little commercial activity in Lagoon Pond. In the main harbor, use is made by coastwise tankers discharging petroleum products at the bulk plants of Mobil Oil and Texaco, Inc. and by Parker Marine, Inc., which transports fuel by barge to neighboring islands and ports. Other commerce consists of a small fishing fleet of draggers and lobstermen that work out of Vineyard Haven Harbor. The latest waterborne commerce statistics indicate that 23, 600 tons of petroleum products are landed each year. During 1964, the ferry service to Vineyard Haven carried 395, 179 passengers, 78, 810 automobiles and 35, 155 tons of dry cargo. In the 10-year period since 1954, passengers carried by ferry service have increased by 16, 500 per year; automobiles carried by 3, 800 per year; and dry cargo by 1, 000 tons per year.

17. In recent years, extensive use of Vineyard Haven Harbor has been made by recreational boating. At present, 265 large craft and 250 small rowboats are permanently based

at Vineyard Haven. With the increasing number of permanent and summer residents inhabiting the island, it is expected that the recreational fleet will continue to grow, provided room is available. Complete service facilities are available in the harbor for boats cruising the coast of Long Island and Nantucket Sounds. An average of 4,000 craft visit the harbor annually.

DIFFICULTIES ATTENDING NAVIGATION

18. The Federal anchorage area in Vineyard Haven Harbor is presently filled to capacity by the large permanently based recreational fleet. As a result, new boats added to the fleet are forced to moor in shallow, exposed and congested areas, causing the commercial tankers and ferries to maneuver with difficulty to their respective docks. This results in groundings, navigation delays and hazards to the recreational and commercial fleets. During severe storms, boats in the vicinity of Martha's Vineyard often seek out Vineyard Haven Harbor for refuge and, finding it crowded, attempt to enter Lagoon Pond. To ease the navigation difficulties to these existing craft, to permit expansion of the presently restricted recreational fleet, and to provide a refuge from storms to the increasing number of transient craft, local interests would now like to utilize the natural anchorage of Lagoon Pond.

19. At present the channel from Vineyard Haven Harbor into Lagoon Pond is narrow and winding with controlling depths of 4 feet (m. l. w.) restricting passage of many craft to periods of high tides. These conditions result in delays and groundings.

PLAN OF IMPROVEMENT

20. The existing recreational and fishing fleets consist of 265 locally-based recreational boats, 54 equivalent transient recreational boats, and 5 fishing craft, a total of 324. There are 80 berths at existing facilities in Vineyard Haven Harbor and 25 berths at or near existing facilities in Lagoon Pond. Thus, the number of boats mooring in Vineyard Haven Harbor is 220.

21. The number of craft that can safely anchor in the Federal 12-acre anchorage behind the State breakwater is 120 (10 boats/acre). The remaining 100 boats are required to anchor in other exposed and congested areas of the harbor having inadequate depths. This results in hazardous mooring conditions,

danger to bathers at the adjacent beach, interference with the ferry boats and coastwise tankers, and direct exposure to northeast storms. Investigation of the study area indicates that expansion of marina-type facilities behind the State breakwater would be limited and would accommodate but a small part of the 100 craft presently encountering difficulties, would not allow for fleet expansion, and would not alleviate other navigation difficulties.

22. Consideration was given in the Federal navigation survey report on Vineyard Haven Harbor, submitted in 1935, to expanding the anchorage by extending the State breakwater, constructing another breakwater from the opposite shore, and dredging the area south of the main fairway. It was found that the added protected area afforded by these features would not be commensurate with the relatively large expenditures required. Present reconsideration of these measures as a possible solution to the navigation difficulties results in findings similar to those of the 1935 report.

23. Lagoon Pond, with its extensive natural anchorage, appears to be the most logical and economical place for development of needed mooring area. Limited use of the pond is now made because of a shoal, narrow, and crooked entrance channel, and a lack of public and private shore facilities.

24. The type and size of recreational craft that are expected to make use of the natural anchorage in Lagoon Pond have drafts ranging from 4 to 6 feet. In order to pass safely through the entrance channel under adverse weather conditions and with proper allowance under the keel, it was considered that a channel width of 100 feet and a depth of 8 feet below mean low water would be needed for the necessary clearance. Widths less than 100 feet would not provide for expected traffic. The 30-foot horizontal clearance in the State-owned highway bridge is not expected to create any difficulty to the number of craft that will transit the waterway. In all probability, the State will increase this clearance when the present bridge is replaced in the not too distant future. The benefits derived from the proposed plan of improvement are based on present conditions. Preliminary consideration was given to providing a channel with a straight alignment perpendicular to the bridge by dredging a portion of the

"Canal Flats" area and relocating the existing jetty stone along the new channel. However, the navigational advantages of a straight access over the one contemplated--involving about 30-degree approach angles--would not warrant the high incremental cost involved.

25. There are two areas of shoaling in the entrance channel -- one on each side of the bridge. A sandbar on the Vineyard Haven Harbor side is located just beyond the end of the existing jetty, resulting from passage of littoral materials around the end of the jetty. The net littoral drift is from the northeast at the jetty. Passage of materials through and over the jetty, substantial for a brief period after jetty construction, is now negligible because of the large fillet developed. It is considered that the entrance bar can best be controlled by extension of the jetty to the 8-foot contour. Beyond this depth the bottom chops off sharply to a depth of 20 feet or more. Thus, further extension would not be beneficial incrementally as an impounding feature or as additional protection. The shoal on the Lagoon Pond side results from a settling out of materials due to velocity transition between the pond and the narrow bridge opening.

26. Beach erosion studies of Martha's Vineyard indicate a predominant southwesterly drift of sand occurs along the shore east of the entrance to Lagoon Pond inlet. No reliable records exist to determine the rate of drift in this locality. Prior to construction of the state jetty east of the inlet in 1934 the shoreline presented a straight configuration in this reach. In the succeeding years following construction of the jetty, the shoreline was extended seaward forming a large fillet of sand to the east of the jetty. The period of time over which the fillet developed cannot be determined as no records are available. Extension of the proposed jetty along the alignment of the State jetty would provide the maximum area for intercepting the littoral drift since it is aligned approximately perpendicular to the shoreline. Reorientation of the jetty extension in a more westerly direction is considered not feasible as the impounding capacity would be considerably less. In addition, the length of the jetty would have to be increased in order to reach an effective intercepting depth.

27. The inlet at Lagoon Pond is exposed to winds from the NNW to NE direction with a limited fetch ranging from 7 to 15 miles. The worst condition at the jetty extension would be experienced by waves approaching from the northeast at right angles to the jetty. Wave heights during northeasterly storms in the outer harbor of Vineyard Haven are estimated to reach 6 to 8 feet. Design of the sand-tight jetty extension was based on the following criteria. Since the trunk of the jetty is in

shallow water subjected to a broken wave height of 8 feet and with side slopes of 1.5 to 1, a design cover stone ranging from 5 to 6 tons is required. A top width of 6 feet was selected for the jetty as the minimum in which cover stone of adequate size could be used. A top elevation of +8 was selected to provide a sufficient height in the sand-tight core to prevent passage of sand through the jetty, retain a wider beach for reducing waves, and improve the visibility of the structure for navigators. Because of the exposure of the structure to the southwest prevailing winds and to facilitate construction it is not considered economical to reduce the size of the armor stone on the channel side. The entire structure would be built on a 2-foot thick layer of bedding stone to prevent uneven settlement.

28. The present controlling depth for access to the State-owned launching ramp at Beach Road ranges from 2 to 3 feet below mean low water. Consideration was given to construction

of an access channel 6 feet deep, 75 feet wide for a distance of approximately 1, 000 feet from deep water in Lagoon Pond to the ramp, in order to provide access for larger, trailered boats than those presently using the facility. Information obtained during the course of the study indicates that the cost of dredging an access channel could not be justified in view of the small number of large craft in the area that could be trailered to the site to utilize the additional depth at the ramp.

29. In view of the above, a plan of improvement has been developed which would provide an entrance channel 8 feet deep, 100 feet wide from deep water in Vineyard Haven Harbor to the natural deep water anchorage within Lagoon Pond. In addition, it is considered necessary to extend the existing jetty, located at the easterly side of the proposed channel, seaward by a distance of 200 feet in order to stabilize the channel entrance and reduce maintenance costs. The plan of improvement would also require the construction of a public landing in Lagoon Pond by local interests. There are two possible sites which would provide convenient access to the anchorage. One site is along the Lagoon Pond side of Beach Road in the vicinity of the State launching ramp and the other on the west shore of Lagoon Pond near the business center of Vineyard Haven.

ESTIMATE OF BENEFITS

30. No commercial fishing benefits are expected to result from the channel improvement. Approximately 100 recreational boats are expected to transfer to Lagoon Pond from Vineyard Haven Harbor shortly after improvement, thus alleviating congestion in the latter harbor. Therefore, all craft would benefit to some degree. The total recreational fleet that would benefit from the project consists of 319 existing boats and the prospective fleet of 92 boats.

31. Benefits were computed on the basis of annual net return to the owners if boats were "for hire." Rowboats, of which there are 250, are not included in the benefit evaluation. The net return varies with the type and size of craft, and is expressed in terms of average depreciated value. The ideal return is considered the maximum return that could be obtained with full, unrestricted use of the harbor. For this particular harbor, the ideal net return

S40P

varies from 7 percent for the large, deepdraft auxiliary sailing vessels to 12 percent for the smaller outboards and inboards. The present return is less than ideal because of the existing navigation difficulties. The improvement would result in the full, ideal return. The net gain represents an average for all craft; i. e., the boats expected to transfer to Lagoon Pond and the craft remaining in the less congested anchorage of Vineyard Haven Harbor.

32. The existing fleet of 265 craft would benefit in the amount of $6,800 after proper reduction for time spent away on cruise. These benefits are computed as shown on Table I.

33. The 4,000 visiting craft are equivalent to 54 locally-based boats. The net boating season totals 75 days. The benefits would be $3,700 as shown in Table II.

34. The improvement would allow for fleet expansion in the amount of 77 craft, 20 of which would be added shortly after improvement. The benefits to the 20 boats are estimated at $6,300. The remaining 57 boats would be added by straight line growth over the 50-year project life with average annual benefits of $7,000. Benefit computations are shown on Tables III and IV, respectively.

35. The improvement is expected to attract 1,100 additional visiting craft each year, which would be equivalent to 15 locally-based boats. Benefits to these craft would total $1,500 as shown on Table V.

TABLE I. BENEFITS TO RECREATIONAL BOATING 75 day net boating season

HARBOR: Lagoon Pond, Mass. (Locally Based Fleet)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% of IDEAL Pres.	% of IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
RECREATIONAL FLEET															
Outboards	10-20	100	1,200	120,000	14	95	100	0.7	840	-	-	-			
Inboards	10-20	50	2,500	125,000	12	95	100	0.6	750	-	-	-			
Cruisers	21-30	25	5,000	125,000	9	90	100	0.9	1,125	12	10	112			
	31-40	7	13,500	94,500	8	85	100	1.2	1,135	18	15	170			
Aux. Sail	21-30	10	5,000	50,000	8	90	100	0.8	400	6	5	20			
	31-40	12	13,900	167,000	8	85	100	1.2	2,050	18	15	310			
	41-50	1	27,000	27,000	7	85	100	1.1	300	20	25	75			
Sailboats	16-20	30	1,000	30,000	12	95	100	0.6	180	-	-	-			
	21-25	30	2,100	63,000	11	90	100	1.1	695	6	5	35			
	31-40	--	---	---											
	41-60	--	---	---											
CHARTER BOATS															
TOTALS		265		$801,500					$7,475			$722			

$7,475 - $722 = $6,753 Say $6,800

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R/9/68

TABLE II. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (Existing Equivalent Transient Fleet)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% of IDEAL		GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
						Pres.	Future								
RECREATIONAL FLEET															
Outboards	10-20	16	1,200	19,200	14	95	100	0.7	135	-	-	-			
Inboards	10-20	3	2,500	7,500	12	95	100	0.6	45	-	-	-			
Cruisers	21-30	10	5,000	50,000	9	90	100	0.9	450	-	-	-			
	31-40	8	13,500	108,000	8	85	100	1.2	1,300	-	-	-			
	41-50	1	34,700	34,700	8	85	100	1.2	415	-	-	-			
Aux. Sail	21-30	8	5,000	40,000	8	90	100	0.8	320	-	-	-			
	31-40	4	13,900	55,600	8	85	100	1.2	668	-	-	-			
	41-50	1	27,000	27,000	7	85	100	1.1	300	-	-	-			
Sailboats	16-20	2	1,000	2,000	12	95	100	0.6	15	-	-	-			
	21-25	1	2,100	2,100	11	90	100	1.1	23	-	-	-			
CHARTER BOATS															
TOTALS		54		$346,100					$3,671			0			

$3,671 - 0 = $3,671 Say $3,700

TABLE III. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (New Boats)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% of IDEAL		GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
						Pres.	Future								
RECREATIONAL FLEET															
Outboards	10-20	5	1,200	6,000	14	0	100	14	840	-	-	-			
Inboards	10-20	4	2,500	10,000	12	0	100	12	1,200	-	-	-			
Cruisers	21-30	3	5,000	15,000	9	0	100	9	1,350	12	10	135			
	31-40	1	13,500	13,500	8	0	100	8	1,080	18	15	162			
Aux. Sail	21-30	1	5,000	5,000	8	0	100	8	400	6	5	20			
	31-40	1	13,900	13,900	8	0	100	8	1,110	18	15	166			
Sailboats	16-20	3	1,000	3,000	12	0	100	12	360	-	-	-			
	21-25	2	2,100	4,200	11	0	100	11	460	6	5	25			
CHARTER BOATS															
TOTALS		20		$70,600					$6,800			$508			

$6,800 - $508 = $6,292 Say $6,300

R/9/68

TABLE IV. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (Gradual Growth)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% of IDEAL Pres.	% of IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
RECREATIONAL FLEET															
Outboards	10-20	15	1,200	18,000	14	0	100	14	2,520	-	-	-			
Inboards	10-20	11	2,500	27,500	12	0	100	12	3,300	-	-	-			
Cruisers	21-30	7	5,000	35,000	9	0	100	9	3,120	12	10	312			
	31-40	3	13,500	40,500	8	0	100	8	3,240	18	15	486			
	51-60	-	-	-											
Aux. Sail	21-30	3	5,000	15,000	8	0	100	8	1,200	6	5	60			
	31-40	3	13,900	41,700	8	0	100	8	3,330	18	15	500			
	41-60	-	-	-											
Sailboats	16-20	7	1,000	10,500	12	0	100	12	840	-	-	-			
	21-30	8	2,100	16,800	11	0	100	11	1,850	6	5	92			
CHARTER BOATS															
TOTALS		57		$201,500					$19,400			$1,450			

$19,400 - $1,450 = $17,950 Av. Ann eq. = $6,950
$17,950 x 0.387 = Say $7,000

R/9/68

TABLE V. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (Attracted Equivalent Transient Fleet)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% of IDEAL Pres.	% of IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
RECREATIONAL FLEET															
Outboards	10-20	1	1,200	1,200	14	95	100	0.7	8	-	-	-			
Inboards	10-20	1	2,500	2,500	12	95	100	0.6	15	-	-	-			
Cruisers	21-30	3	5,000	15,000	9	90	100	0.9	135	-	-	-			
	31-40	4	13,500	54,000	8	85	100	1.2	650	-	-	-			
	41-50	1	34,700	34,700	8	85	100	1.2	416	-	-	-			
Aux. Sail	21-30	3	5,000	15,000	8	90	100	0.8	120	-	-	-			
	31-40	1	13,900	13,900	8	85	100	1.2	167	-	-	-			
Sailboats	16-20	1	1,000	1,000	12	95	100	0.6	6	-	-	-			
CHARTER BOATS															
TOTALS		15		$137,300					$1,517			0			

$1,517 - 0 = $1,517 Say $1,500

SUMMARY OF ANNUAL BENEFITS

36. Increased Recreational Boating:

Existing locally-based fleet (265)	$6,800
Existing equivalent transient fleet (54)	3,700
New boats (2)	6,300
Gradual growth (57)	7,000
Attracted equivalent transient fleet (15)	1,500
TOTAL	$25,300

SHORELINE CHANGES

37. Surveys made by the U.S. Coast and Geodetic Survey in the vicinity of the entrance to Lagoon Pond, prior to construction of the State jetty, indicate that the high water shoreline presented a fairly straight configuration parallel to Beach Road. Sand in the surf zone east of the entrance is transported laterally along the shore southwesterly to the entrance. Prior to the State jetty construction, this material was intercepted by tidal flows through the entrance to the pond causing it to settle out forming a delta shoal extending the six-foot contour seaward into Vineyard Haven Harbor for a distance of 700 feet. Very little material succeeded in getting past the entrance to the west shore which has remained stable over the period of record. The sand deposited at the entrance to Lagoon Pond left shallow and shifting channels leading into the pond with an average depth of 3 feet. The State constructed the jetty to control this sand movement and to stabilize a natural channel. The jetty proved successful during its 33 years of use by building out a large fillet of sand seaward and deepening of the entrance channel by at least 2 feet. This jetty is now filled to capacity. Surveys made in conjunction with this report indicate that sand is moving around the seaward end resulting in shoaling to an average depth of 4 feet for a distance of 150 feet westward of the jetty. The existing jetty has had no adverse effect on the shoreline west of Lagoon Pond in let because the shore is riprapped to protect the highway in this area. This portion of the shore is not used for a recreational beach requiring additional sand. Therefore, it is considered that extension of the jetty would not produce a harmful effect on the west shore. It is proposed to hydraulically deposit the material to be dredged from the project channel on the shore at a minimum distance of 1,000 feet east of the jetty. Along this reach there are approximately 15 small stone

jetties which would be used to retain the spoil material. It is not expected that the quantity of sand deposited in this reach would materially shorten the life of the project jetty as any materials passing around the end of the jetty extension would be carried out to deep water in Vineyard Haven Harbor by tidal action. There are no other nearby spoil areas in either Lagoon Pond or Vineyard Haven Harbor within economical pumping distance. Hauling dredged materials to an approved deep water disposal area in Vineyard Haven Sound would be much more costly because of the small amount of material involved.

REQUIRED AIDS TO NAVIGATION

38. The United States Coast Guard has been consulted in regard to establishing aids to navigation for the plan of improvement. In a letter dated 29 December 1967 (Appendix B), the Coast Guard advised that no aids to navigation will be required for the project.

ESTIMATES OF FIRST COSTS

39. An estimate of first cost for construction of the proposed plan of improvement has been made on the basis of soundings, probings and borings taken during December 1966. The materials to be dredged would be primarily a gravelly sand. Unit prices are based on prices prevailing in March 1968, and on the removal of the material by hydraulic methods with spoil disposal on adjacent beaches. Dredging quantities are in terms of in place measurement and provide for dredging to depths 8 feet below mean low water plus an allowance for one-foot overdepth with side slopes one vertical to three horizontal.

PROJECT COST ESTIMATE

Cost Acct. No.	Item	Estimated Cost (Mar. 1968 Prices)
09	Dredging (ordinary materials) 19,000 c.y. @ $3.00	$57,000
20	Structures	
	Jetty extension 4,500 tons @ $13	58,500
		$115,500
	Contingencies	17,500
		$133,000
	Engineering and Design	13,000
	Supervision & Administration	14,000
		*$160,000

*Exclusive of $18,200 for project study costs.

APPORTIONMENT OF COSTS AMONG INTERESTS

40. The first cost of construction of the proposed improvement has been apportioned between Federal and non-Federal interests in proportion to the general and local benefits derived. The benefits to be derived from improvements at Lagoon Pond are entirely recreational in nature. The costs, therefore, are apportioned 50 percent Federal and 50 percent non-Federal.

Summary of Apportioned Cost:

Federal	
Corps of Engineers	$80,000
Non-Federal	
Cash Contribution	$80,000
Public Landing	10,000*
Total Non-Federal Cost	$90,000

*Self-liquidating

ESTIMATE OF ANNUAL CHARGES

41. The annual charges for the improvement have been computed using a project life of 50 years and an interest rate of 3-1/4 percent for both Federal and non-Federal charges. Maintenance costs for dredging the channel are based on experience with the existing Federal project in Vineyard Haven Harbor and similar conditions. An allowance of 1,000 cubic yards of dredging per year in the Federal project has been made. Maintenance costs of the breakwater are based on experience with similar structures under comparable conditions. The investment and annual charges for the improvements are shown below:

Federal Annual Charges

Interest and amortization (.04073 x $80,000) =	$3,250
Maintenance Channel Dredging 1,000 c.y. @ $3.25 =	3,250
Maintenance of Jetty =	1,000
Total Federal Annual Charges	$7,500

Non-Federal Annual Charges

Interest and amortization (.04073 x $80,000) =	$3,250
Total Federal and Non-Federal Annual Charges	$10,750

COMPARISON OF BENEFITS AND COSTS

42. A comparison of the estimated annual benefits totaling $25,300 and annual charges of $10,750 indicates a benefit-cost ratio of 2.4 to 1.

OPERATION AND MAINTENANCE

43. Maintenance of the channel and jetty will be the responsibility of the United States. All other facilities will be maintained and operated by local interests. It is estimated that periodic dredging will be required every 10 years. The annual cost for maintenance dredging of the channel and for repairs to the jetty is estimated at $3,250 and $1,000, respectively.

PROPOSED LOCAL COOPERATION

44. The benefits to be derived from improvement of Lagoon Pond entrance are considered to be entirely recreational in nature, therefore Federal participation is limited to 50% of the first cost of construction. In order to construct the project, local interests would be required to make a cash contribution of 50% of the construction cost, currently estimated at $80,000. In addition, local interests would be required to provide: An adequate public landing with berthing depths commensurate to the Federal project, open to all on equal terms; all lands, easements and rights-of-way for construction and maintenance of the project; hold and save the United States free from damages due to construction and subsequent maintenance; regulate the use of the harbor including prohibiting discharge of pollutants in the waters of Lagoon Pond

COORDINATION WITH OTHER AGENCIES

45. All Federal, State and local agencies having an interest in the navigation improvement of Lagoon Pond were notified of the public hearing held in Tisbury on 26 May 1964. The United States Fish and Wildlife Service has submitted a conservation and development report. Their report is included in Appendix A. They anticipate no significant adverse effect on fish and wildlife resources as a result of the proposed improvement. The Bureau of Outdoor Recreation and the Federal Water Pollution Control Administration were consulted for their comments on the effect of the project on their activities. Their comments are included in Appendix A. The United States Coast Guard letter is included as Appendix B. The Commonwealth of Massachusetts through the Department of Public Works and the Town of Tisbury have furnished comments and indicated their ability and willingness to meet the requirements of local cooperation. (See Appendix C).

SCHEDULE FOR DESIGN AND CONSTRUCTION

46. Preparation of contract plans and specifications are estimated to require four months. The estimated cost is $5,000. Construction of the project can be accomplished under two contracts to be completed in one year. Estimated expenditures are as follows:

(a) Allocated to Date

Reconnaissance Report	$ 4,200
Detailed Project Report	14,000
Total Study Costs	$18,200

(b) Required to Complete

Plans and Specifications	$ 5,000
Construction, Engineering during Construction, and Supervision and Administration	75,000
Total Cost (Corps of Engrs)	$80,000

CONCLUSIONS

47. Expansion of recreational boating activity in Vineyard Haven Harbor in recent years has resulted in a serious overcrowding in the existing Federal anchorage. Boats are now anchoring in the fairway approach to the commercial wharves, interfering with ferry operations and hindering future economic growth. Local interests have become aware of this problem and have requested some form of improvement to alleviate the situation. Investigation indicates that expansion of the existing Federal anchorage would be uneconomical and would be only a temporary stopgap to relieve the congestion. Lagoon Pond on the other hand contains a large, natural deep water area entirely suitable for anchorage of small recreational craft. The pond is located close enough to Vineyard Haven to be developed into a site for the additional area needed. In order to make Lagoon Pond available as an anchorage, it will be necessary to provide an entrance channel 8 feet deep, 100 feet wide from deep water in Vineyard Haven Harbor leading into the natural deep water of the pond. In addition, it is considered necessary to extend the existing jetty, located to the east of the entrance, a distance of 200 feet seaward to reduce the maintenance cost of the proposed channel. The jetty would intercept the westward littoral drift of sand along the adjacent shore east of the entrance and provide shelter for boats approaching the entrance to the pond.

48. This plan of improvement would provide the additional space for small craft that is so vitally needed. The resulting benefits to recreational boating would yield a ratio of annual benefits to annual costs of 2.4 to 1. Local interests have indicated that the improvement would meet their needs, and that the required local cooperation would be met. All agencies known to be interested have been consulted and have expressed no objection to the improvement.

RECOMMENDATION

49. The Division Engineer recommends that a Federal navigation project at Lagoon Pond, Tisbury, Martha's Vineyard, Massachusetts be authorized under provisions of Section 107 of the River and Harbor Act of 1960 as amended in 1965. The project would provide an entrance channel 8 feet deep, 100 feet wide from deep water in Vineyard Haven Harbor leading into the natural deep water anchorage in Lagoon Pond and seaward extension of the existing jetty at the entrance for a distance of 200 feet. The total project cost is currently estimated to be $160,000. Annual maintenance costs are estimated at $4,000 for the channel and jetty. In view of the local nature of the recreational benefits, local interests should be required to contribute toward the cost of the project. The recommendation is made subject to the conditions that local interests:

a. Provide a cash contribution of 50 percent of the project construction cost, currently estimated at $80,000.

b. Assume full responsibility for all project costs in excess of the $500,000 Corps of Engineers' limitation under Section 107 of the 1960 River and Harbor Act, as amended.

c. Provide, maintain and operate a public landing with berths commensurate with channel depth, and provide and maintain necessary access roads, parking areas and other public use facilities open to all on equal terms.

d. Hold and save the United States free from damages which may result from construction and maintenance of the project.

e. Provide without cost to the United States all lands, easements and rights-of-way required for construction and subsequent

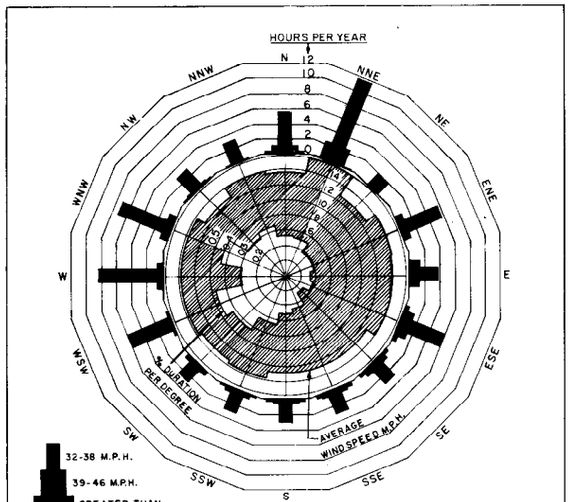
maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of spoil, and also the necessary retaining dikes, bulkheads and embankments therefor or the cost of such retaining works.

f. Regulate the use, growth and development of the harbor facilities with the understanding that they will be open to all on equal terms.

g. Establish regulations prohibiting discharge of untreated sewage, garbage and other pollutants in the waters of Lagoon Pond by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and local authorities responsible for pollution prevention control.

4 Incl
1. Maps - 2 Plates
2. Appendix A - Comments of Federal Agencies
3. Appendix B - U. S. Coast Guard Report
4. Appendix C - Letters by Local Interests

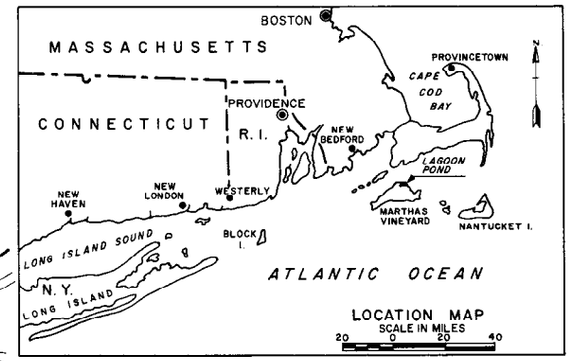
REMI O. RENIER
Colonel, Corps of Engineers
Division Engineer

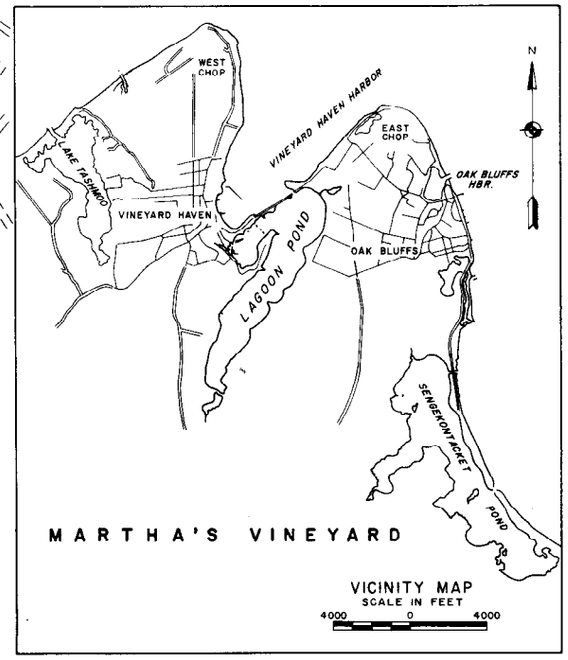


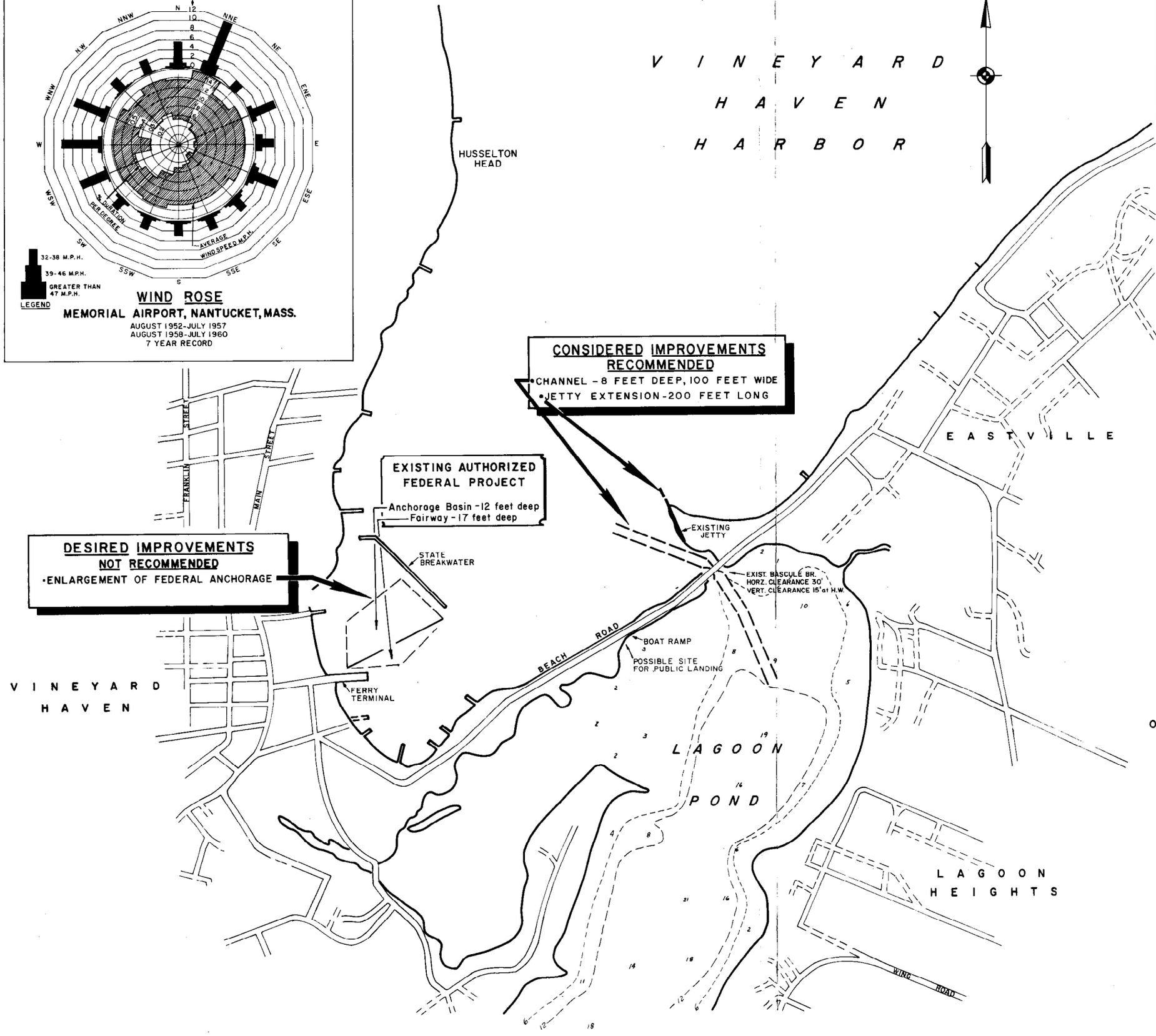
WIND ROSE

MEMORIAL AIRPORT, NANTUCKET, MASS.

AUGUST 1952-JULY 1957
AUGUST 1958-JULY 1960
7 YEAR RECORD







REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY	TR. BY	CK. BY
A.D.C.	A.D.C.	

SUBMITTED: Herman H. Hystad, PROJECT ENGINEER
Oscar E. Agan, CHIEF, COASTAL DEVEL. SECT.
APPROVAL RECOMMENDED: CHIEF, PLANNING BRANCH
APPROVED: CHIEF, ENGINEERING DIVISION

LAGOON POND, TISBURY
MARTHA'S VINEYARD, MASS.

SCALE IN FEET
400 0 400 800 1200

DATE: APRIL 1968

TO ACCOMPANY DETAILED PROJECT REPORT DATED: 13 MAY 1968

SCALE

DRAWING NUMBER
Ma 22

SHEET 1 OF 2

PLATE NO. 1

CORPS OF ENGINEERS

U. S. ARMY

E175,000

E176,000

E177,000

N168,000

N167,000

N166,000

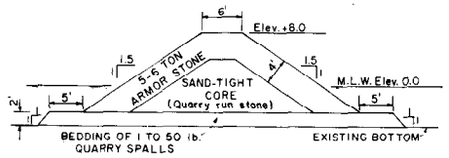
LIST OF PROBINGS

NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W. DEPTH OF PROBE	PENETRATION	REMARKS
P1	8.7	10.0	1.3	
P2	8.3	10.0	1.7	
P3	6.9	10.0	3.1	
P4	7.0	10.0	3.0	
P5	6.8	10.0	3.2	
P6	6.1	10.0	3.9	
P7	4.2	7.0	2.8	Refusal
P8	4.6	10.0	5.4	
P9	5.0	10.0	5.0	
P10	7.0	10.0	3.0	
P11	6.9	10.0	3.1	
P12	6.6	10.0	3.4	
P13	5.4	10.0	4.6	
P14	5.1	10.0	4.9	
P15	5.9	10.0	4.1	
P16	8.4	10.0	1.6	
P17	7.9	10.0	2.1	
P18	8.9	10.0	1.1	
P19	4.9	10.0	5.1	
P20	6.0	10.0	4.0	
P21	6.8	10.0	3.2	
P22	4.9	10.0	5.1	
P23	8.6	10.0	1.4	
P24	8.9	10.0	1.1	
P25	7.8	10.0	2.2	
P26	7.8	10.0	2.2	
P27	7.6	10.0	2.4	
P28	9.1	10.0	0.9	

VINEYARD HAVEN HARBOR

RECOMMENDED IMPROVEMENT
200 FOOT LONG JETTY EXTENSION

B.C. 1



TYPICAL SECTION - JETTY EXTENSION
SCALE 1"=10'

P-1 P-2 P-3 P-4 P-5 P-6 P-7 P-8 P-9 P-10 P-11 P-12 P-13 P-14 P-15 P-16 P-17 P-18 P-19 P-20 P-21 P-22 P-23 P-24 P-25 P-26 P-27 P-28

FD-1 FD-2 FD-3 FD-4 FD-5

EXISTING STONE JETTY

TOE OF SLOPE

100'

APPROX. M.H.W.

To Oak Bluffs

OAK BLUFFS

ROAD

BRUSH POND

LAG (1966)

APPROX. M.H.W.

TISOAK (1936)

EXIST. BASCULE BR.
HORZ. CLEARANCE 30'
VERT. CLEARANCE 15' at H.W.

RECOMMENDED IMPROVEMENT
8-FOOT CHANNEL

BEACH

APPROX. M.H.W.

To Vineyard Haven

STATE OWNED BOAT LAUNCHING RAMP

POSSIBLE SITE FOR PUBLIC LANDING

APPROX. M.H.W.

LAGOON POND

LAGOON POND

N

FD-1
20 DEC. 1966
El. -7.0 M.L.W.

0.0	Wt. of tools	SM	Silty Sand, Shells
1.6		SP	Gravelly Sand trace Gravel and Shells
4.5			Silty Sand and Shells
5.0			

FD-2
20 DEC. 1966
El. -3.5 M.L.W.

0.0	Wt. of tools		Sand, Grass, Shells and Gravel
1.7		SP	Gravelly Sand and Shells
5.0			
10.0			

FD-3
23 DEC. 1966
El. -1.9 M.L.W.

0.0		SP	Gravelly Sand
3.6		SM	Silty Sand
5.0		SP	Sand, trace Gravel
6.5			Sand
10.0			
13.0		CM	Sandy Gravel
15.0			

FD-5
23 DEC. 1966
El. -6.1 M.L.W.

0.0			Sand
1.0		SP	Sand, trace Gravel
5.0			
10.0			
12.3			Silty fine Sand
15.0			
20.0			
21.5			Silty fine Sand, Shells
23.0		SP	Gravelly Sand
25.0			

FD-4
22 DEC. 1966
El. -4.9 M.L.W.

0.0			Sand, Grass
0.8		SP	Sand
3.0			Gravelly Sand
5.0			

GRAPHIC LOGS
SCALE 1"=5'

LEGEND FOR GRAPHIC LOGS

FD(No.) Test boring designation
DATE Date exploration completed
ELEV. Mean low water elev. of top of boring

SP
12

Group letter symbol according to Unified Soil Classification System

Number of blows per foot of penetration using a 140 pound hammer falling freely an average of 30" on a standard sample spoon equipped with a bevelled and sharpened drive shoe. (See note below.) Zero blow count indicates penetration by weight of tools alone.

BORING NOTES

Normal length of continuous drive of sampling spoon is 5.0 feet.

Penetration resistance of sampling spoon increases with length of drive, and blow counts, therefore, generally increase correspondingly except where distinct changes in material occur within the length of drive. In gravels, sands and gravels, and some glacial tills, the presence of coarse gravel, cobble or boulder sizes causes the blow count to become erratic, and therefore may not be indicative of the degree of compaction.

Borings are shown thus: FD-1 ◉

GENERAL NOTES:

Soundings and probings are in feet and tenths and are referred to the plane of Mean Low Water.

Hydrography and topography from surveys of Oct. and Dec. 1966, by H.A. Fishlock.

Topography from previous information.

Probes taken with a 3/4" aluminun pipe forced down by two men.

B.M. No. 6 (1953) (West Chop) A standard disk stamped "6 1953" set in S.E. end of concrete retaining wall in front of Knowles house. Top of disk flush with top of wall. Elev. 9.92 feet above M.L.W.

Field books: R B H 2151, 2152 & 2600.

Coordinates are on the Lambert system for the State of Massachusetts.

Probings shown thus: • P-2.

M.H.W. shown thus. ~~~~

Recommended improvement shown thus: ——

8' depth contour shown thus: - - - -

REVISION	DATE	DESCRIPTION	BY

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY G.J.S. W.J.S. | TR. BY W.J.R. | CK. BY

SUBMITTED: Harrison A. Smith
PROJECT ENGINEER

CHIEF, COASTAL DEVEL. SECT.

APPROVAL RECOMMENDED:
CHIEF, PLANNING BRANCH

APPROVED
CHIEF, ENGINEERING DIVISION

DATE APRIL 1968

LAGOON POND, TISBURY
MARTHA'S VINEYARD, MASS.
SURVEY MAP

SCALE IN FEET
100 0 100 200 300

TO ACCOMPANY DETAILED PROJECT REPORT DATED: 13 MAY 1968

SCALE AS SHOWN

DRAWING NUMBER
Ma 22

SHEET 2 OF 2

PLATE NO. 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
U. S. POST OFFICE AND COURTHOUSE
BOSTON, MASSACHUSETTS 02109

April 16, 1968

Division Engineer
New England Division
U.S.Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

This is our conservation and development report on your study for navigation improvements for Lagoon Pond on Martha's Vineyard (Dukes County), Massachusetts, being made under the authority of Section 107 of the River and Harbor Act approved July 14, 1960. Our report was prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inc.), in cooperation with the Massachusetts Division of Marine Fisheries and Division of Fisheries and Game and has their concurrence as indicated by letters dated April 4, 1968 and April 11, 1968, respectively. It has also been coordinated with and represents the views of the Bureau of Commercial Fisheries.

We understand that the plans for navigational improvements provide for the dredging of an entrance channel 2,400 feet long, 100 feet wide, and eight feet deep, mean low water. The dredged material, approximately 19,000 cubic yards, will be placed on the beach east of the jetty. This will provide sand material for beach protection. At this time the plan does not include any provision for anchorage dredging in Lagoon Pond.

The existing stone jetty at the east side of the entrance channel will be extended 200 feet seaward. The design of the jetty extension provides a flat top surface approximately six feet wide at an elevation of eight feet above m.l.w.

We have ascertained that construction and operation of the project will not adversely affect fish and wildlife resources of the area. Little or no sport fishery benefits will accrue to the jetty extension since it will be in relatively shallow water.

The Commonwealth of Massachusetts has constructed a boat launching ramp and parking area in Lagoon Pond westerly of the bridge. At the present time the water depth in the ramp area is about 2-3 feet at m.l.w. It appears that an access channel to connect the ramp area with the proposed Federal channel would be desirable; for this reason the project plans should be closely coordinated with the Commonwealth of Massachusetts in order to include consideration of an access channel to the state boat launching ramp from the Federal channel.

The Massachusetts Division of Marine Fisheries operates a lobster hatchery on Lagoon Pond which draws its water supply from the Pond. The critical period at the hatchery extends over the months of May, June, and July. Any siltation associated with dredging of the entrance channel is not expected to affect the operation of the hatchery. However, the Director of the hatchery should receive advance notice of the dredging schedule in the event modification of hatchery operations may be warranted.

We recommend:

1. That project plans be closely coordinated with the Commonwealth of Massachusetts in order to include consideration of an access channel to the state boat launching ramp from the Federal channel.

2. That the Director of the Massachusetts Division of Marine Fisheries' lobster hatchery receive advance notice of the dredging schedule.

If there are any changes in specific portions of the project plan please advise us so that we can determine whether additional fish and wildlife studies are needed.

We appreciate the opportunity to report on your present project plans.

Sincerely yours,

Eugene E. Crawford

Deputy Regional Director

UNITED STATES
DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
Northeast Region
John Fitzgerald Kennedy Federal Building
Boston, Massachusetts 02203

January 3, 1968

Mr. John Wm. Leslie
Chief, Engineering Division
New England Division, Corps of Engineers
U. S. Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Leslie:

Reference is made to your letter dated December 19, 1967, concerning a Federal navigation improvement project at Lagoon Pond, Tisbury, Martha's Vineyard, Massachusetts.

We have no objection to this project. However, it should be brought to the attention of the contractor that he must conform at all times with Federal and State Water Quality Standards and other State standards regarding water quality.

Sincerely yours,

Edward J. Conley
Federal Activities Coordinator

cc: Mass. Div. of Water
Pollution Control

APPENDIX B

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Address reply to:
COMMANDER (o-1)
First Coast Guard District
J. F. Kennedy Federal Bldg.
Government Center
Boston, Mass. 02203
617 223-3634

3260
29 December 1967

From: Commander, First Coast Guard District
To: Division Engineer, U. S. Army, Corps of Engineers

Subj: Lagoon Pond, Tisbury, (Martha's Vineyard Island) Massachusetts

Ref: (a) Corps of Engineers ltr NEDED-R of 11 December 1967

1. The plan of improvement under consideration for subject harbor has been received. The proposed improvements will not affect Coast Guard operations in the area.

2 No additional navigational aids will be required. However, we propose relocating Vineyard Haven Buoy 1 to a new position, as indicated on the enclosed Corps of Engineers drawing. Annual maintenance costs will remain the same.

R. J. HANSON
By direction

Encl: (1) Corps of Engineers drawing dtd Dec., 1967

APPENDIX C

TOWN OF TISBURY

Office of

TOWN CLERK AND ACCOUNTANT

VINEYARD HAVEN, MASSACHUSETTS

March 27, 1968

Colonel Remi O. Renier
Division Engineer
New England Division, Corps of Engineers
Department of the Army
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Renier:

At the annual town meeting held March 5th, adjourned to March 6th for completion of action on Articles in the warrant, the Town voted to raise and appropriate the sum of $20,000.00 as part of the Town's share of the cost of the Federal Navigation Improvement Project for Lagoon Pond.

It was explained at the meeting by Selectman Manuel M. Maciel and Mr. Thomas Hale, Harbor Master, that the cost of construction of the project is estimated to be $160,00.00 at this time and the non-Federal interests will be required to share in an amount equal to fifty percent of the total cost; that the non-Federal fifty percent will be divided between the State and the Town; that there might be a possibility of participation in the Town share by the County of Dukes County and the Town of Oak Bluffs inasmuch as the project will also be of benefit to Oak Bluffs, but if they are not willing to join in the expense, then the Town of Tisbury would be responsible for the entire Town share of $40,000.

The strong affirmative vote, 114 to 65, would seem to me to indicate that our towns people feel the proposed plan of improvement to meet the needs of recreational navigation for small boats in Lagoon Pond is so necessary and desirable that it warrants their assuming the entire Town share if the other local interests decide not to contribute.

You may also be interested to know that the project was fully explained to the town Finance Committee and was recommended by that Committee.

Very truly yours,

Ruth L. Smith
Town Clerk

APPENDIX C

The Commonwealth of Massachusetts

Department of Public Works

Office of the Commissioner

100 Nashua Street, Boston 02114

March 29, 1968

Remi O. Renier, Colonel
District Engineer-New England Division
U. S. Army Corps of Engineers
424 Trapelo Road,
Waltham, Massachusetts

Dear Colonel Renier: Re: NEDED-R

In reply to your letter of December 27, 1967, relative to the proposed improvement of Red Brook Harbor, Bourne and Lagoon Pond, Tisbury in which you request our comments on same, please be informed that this Department would be willing to meet the requirements of local cooperation subject to the following conditions:

1. The enactment of an enabling statute by the General Court;

2. The appropriation of sufficient funds by the General Court to provide the Commonwealth's share of the local contribution;

3. Execution of a satisfactory assurance by the Towns of Bourne and Tisbury; and,

4. Deposit of the towns' share of the local contribution with the State Treasurer.

On approval of the project and subsequent allotment of the Federal funds we would be happy to file both the necessary enabling Bill and the appropriation request with the General Court for its approval.

Satisfaction of the above 3rd and 4th condition are necessarily contingent upon action taken by the Towns of Bourne and Tisbury.

Very truly yours,

JOHN D. WARNER
Associate Commissioner

JOHN A. VOLPE
GOVERNOR

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE DEPARTMENT
STATE HOUSE, BOSTON

August 16, 1968

Colonel Remi O. Renier
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts

Dear Colonel Renier:

Many thanks for requesting my comments on the proposed Federal improvement of Lagoon Pond, Oak Bluffs - Tisbury on the island of Martha's Vineyard. This would be a co-operative project, performed by the Corps of Engineers and financed with Federal, State and Town Funds.

The mushrooming growth of recreational boating has resulted in the sudden overcrowding of all of our harbors, bays, rivers and ponds and the end of this condition is not yet in sight. Lagoon Pond is no exception and the widening and deepening of the entrance channel on both sides of Beach Road will not only relieve conditions in the pond but also in Vineyard Haven Harbor. Extension of the easterly jetty is essential as sands are drifting around the existing jetty and shoals are constricting the channel to a considerable degree. I personally feel that this project will improve shellfishing on the pond by increased volume and improved circulation of seawater.

I am highly in favor of this proposed project and if the Chief of Engineers approves the work under Section 107 of the 1960 River and Harbor Act, I shall request the General Court to provide the required State contribution.

Sincerely,

Governor

THE FOLLOWING PAGES
WERE SUPERSEDED PER
PAGES "R/9/68."

8. Annual Costs

Federal Annual Charges

Interest & Amortization (0.04073 x $80,000)	$ 3,250
Maintenance:	
Channel	3,000
Jetty	1,000
	$ 7,250

Non-Federal Annual Charges

Interest & Amortization (0.04073 x $80,000)	$ 3,250
Total Annual Charges	$10,500

9. Benefits. Benefits are expected to accrue to recreational boating in the amount of $21,700 annually.

10. Benefit-Cost Ratio. 2.1 to 1.0.

11. Requirements of Local Cooperation.

a. Contribute 50% of the first cost of the Federal project.

b. Assume full responsibility for all project costs in excess of the $500,000 Corps of Engineers' limitation under Section 107 of the 1960 River and Harbor Act, as amended in 1965.

c. Provide, maintain and operate without cost to the United States a public landing with berths commensurate with the channel depth, and provide and maintain necessary access roads, parking areas and other public use facilities open to all on equal terms.

d. Hold and save the United States free from all damages which may result from the construction and subsequent maintenance of the project.

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e. Provide without cost to the United States all lands, easements and rights-of-way required for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the public interest for initial and subsequent disposal of spoil, and also necessary retaining dikes, bulkheads and embankments therefor or the cost of such retaining works.

f. Regulate the use, growth and development of the harbor facilities with the understanding that they will be open to all on equal terms.

g. Establish regulations prohibiting discharge of untreated sewage, garbage and other pollutants in the waters of Lagoon Pond by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and Local authorities responsible for pollution prevention and control.

regularly scheduled daily flights from Boston, New York City, New Bedford, and Hyannis.

7. The island is divided into 6 towns; namely, Chilmark, Edgartown, Gay Head, Oak Bluffs, Tisbury and West Tisbury. The permanent population has grown since 1930 from 4, 953 to 5, 829 (1960). During the summer months, the population increases to 45, 000. Much of the service facilities to the island is provided through Vineyard Haven Harbor which is the most extensively developed harbor on the island.

BRIDGES AFFECTING NAVIGATION

8. The only bridge spanning the waterway under consideration is the Vineyard Haven-Oak Bluffs highway bridge. It is a timber pile concrete slab bascule structure with a horizontal clearance of 30 feet and a vertical clearance of 15 feet when closed. The bridge was constructed by the Commonwealth of Massachusetts in 1935 at a cost of $100, 000.

PRIOR REPORTS

9. A previous report, printed as House Document No. 65, 74th Congress, 1st Session, 1935, considered navigation improvements at Vineyard Haven Harbor and at the entrance to Lagoon Pond. The report recommended dredging an anchorage 12 feet deep behind the existing State breakwater at Vineyard Haven Harbor and providing a fairway in the inner harbor to the steamboat wharf to a depth of 17 feet. Improvement of the Lagoon Pond entrance was not recommended because of a lack of sufficient benefits.

EXISTING CORPS OF ENGINEERS PROJECT

10. There is no existing Federal project at Lagoon Pond. The nearest Federal project is immediately west of the Lagoon Pond entrance at Vineyard Haven Harbor. Adopted in 1935, the project provides for a fairway 17 feet deep from the steamboat wharf at the head of the harbor to the State breakwater and an anchorage area 12 feet deep behind the breakwater. In 1964, except for some minor shoaling, controlling depths were 17 feet in the fairway and 12 feet in the anchorage.

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OTHER IMPROVEMENTS

11. Improvements to the Lagoon Pond entrance have been made by the Commonwealth of Massachusetts in cooperation with the Towns of Tisbury and Oak Bluffs. The improvements consisted of a short jetty on the east side of the pond entrance and a 6-foot channel parallel to the jetty through the sandspit into Lagoon Pond. In Vineyard Haven Harbor, the Commonwealth also constructed a breakwater 1,200 feet southeasterly from a point near the western shore of the harbor. All of the work was completed in 1935. More recently, the Commonwealth has constructed an access ramp with parking facilities adjacent to Lagoon Pond. The location of the ramp is off Beach Road, 1,000 feet southwest of the pond entrance.

TERMINAL AND TRANSFER FACILITIES

12. With the exception of two boatyards located at its north end, Lagoon Pond is practically without terminal facilities. Most of the terminals servicing the Tisbury-Oak Bluffs area as well as the rest of the island are located at the southeast end of Vineyard Haven Harbor near the developed community of Vineyard Haven. In Vineyard Haven Harbor there are 5 boatyards, 2 oil terminals, a town pier, a yacht club, and a ferry terminal. In recent years, the harbor has experienced a rapid growth in recreational boating. Over 500 craft are permanently based in the harbor. A natural stopover for boats plying the waters of Nantucket Sound, it attracts 4,000 transient craft each year.

13. By contrast, the fishing fleet is small, consisting of three 35-foot lobster boats and one 40-foot trawler. Most of the commercial fish catch is landed in New Bedford or other mainland ports. Scallop and quahog shellfishing, mainly by rowboats, is extensive in Lagoon Pond.

IMPROVEMENTS DESIRED

14. At the public hearing, local interests presented a desired plan of improvement that would provide for:

a. Enlargement of the Federal anchorage area behind the existing State breakwater in Vineyard Haven Harbor dredged to a depth of 12 feet mean low water.

see R/9/68 + 4a

danger to bathers at the adjacent beach, interference with the ferry boats and coastwise tankers, and direct exposure to northeast storms. Investigation of the study area indicates that expansion of marina-type facilities behind the State breakwater would be limited and would accommodate but a small part of the 100 craft presently encountering difficulties, would not allow for fleet expansion, and would not alleviate other navigation difficulties.

22. Consideration was given in the Federal navigation survey report on Vineyard Haven Harbor, submitted in 1935, to expanding the anchorage by extending the State breakwater, constructing another breakwater from the opposite shore, and dredging the area south of the main fairway. It was found that the added protected area afforded by these features would not be commensurate with the relatively large expenditures required. Present reconsideration of these measures as a possible solution to the navigation difficulties results in findings similar to those of the 1935 report.

23. Lagoon Pond, with its extensive natural anchorage, appears to be the most logical and economical place for development of needed mooring area. Limited use of the pond is now made because of a shoal, narrow, and crooked entrance channel, and a lack of public and private shore facilities.

24. The type and size of recreational craft that are expected to make use of the natural anchorage in Lagoon Pond have drafts ranging from 4 to 6 feet. In order to pass safely through the entrance channel under adverse weather conditions and with proper allowance under the keel, it was considered that a channel width of 100 feet and a depth of 8 feet below mean low water would be needed for the necessary clearance. Widths less than 100 feet would not provide for expected traffic. The 30-foot horizontal clearance in the State-owned highway bridge is not expected to create any difficulty to the number of craft that will transit the waterway. In all probability, the State will increase this clearance when the present bridge is replaced in the not too distant future. The benefits derived from the proposed plan of improvement are based on present conditions. Preliminary consideration was given to providing a channel with a straight alignment perpendicular to the bridge by dredging a portion of the

"Canal Flats" area and relocating the existing jetty stone along the new channel. However, the navigational advantages of a straight access over the one contemplated--involving about 30-degree approach angles--would not warrant the high incremental cost involved.

25. There are two areas of shoaling in the entrance channel--one on each side of the bridge. A sandbar on the Vineyard Haven Harbor side is located just beyond the end of the existing jetty, resulting from passage of littoral materials around the end of the jetty. The net littoral drift is from the northeast at the jetty. Passage of materials through and over the jetty, substantial for a brief period after jetty construction, is now negligible because of the large fillet developed. It is considered that the entrance bar can best be controlled by extension of the jetty to the 8-foot contour. Beyond this depth the bottom chops off sharply to a depth of 20 feet or more. Thus, further extension would not be beneficial incrementally as an impounding feature or as additional protection. The shoal on the Lagoon Pond side results from a settling out of materials due to velocity transition between the pond and the narrow bridge opening.

26. Extension of the existing jetty to the 8-foot depth curve would increase the impoundage capacity and reduce further drift of littoral materials into the channel to negligible amounts. It is considered that additional channel stabilization by parallel jetties or slope revetment would not be necessary. The rate of future shoaling would be slow and could be more economically controlled by maintenance dredging.

27. The jetty extension would be about 200 feet long and consist of a sand-tight core of quarry-run stone protected by armor stone, all placed on a layer of bedding stone to control settlement. A top elevation of +6 would probably be sufficient to provide adequate protection against wave overtopping, although an important function of the extension would be to provide a sand-tight barrier. The size of armor stone would result in a top elevation of sand-tight core stone too low to provide for littoral drift. Therefore, a top elevation of +8 was selected.

28. The present controlling depth for access to the State-owned launching ramp at Beach Road ranges from 2 to 3 feet below mean low water. Consideration was given to construction

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of an access channel 6 feet deep, 75 feet wide for a distance of approximately 1,000 feet from deep water in Lagoon Pond to the ramp, in order to provide access for larger, trailered boats than those presently using the facility. Information obtained during the course of the study indicates that the cost of dredging an access channel could not be justified in view of the small number of large craft in the area that could be trailered to the site to utilize the additional depth at the ramp.

29. In view of the above, a plan of improvement has been developed which would provide an entrance channel 8 feet deep, 100 feet wide from deep water in Vineyard Haven Harbor to the natural deep water anchorage within Lagoon Pond. In addition, it is considered necessary to extend the existing jetty, located at the easterly side of the proposed channel, seaward by a distance of 200 feet in order to stabilize the channel entrance and reduce maintenance costs. The plan of improvement would also require the construction of a public landing in Lagoon Pond by local interests. There are two possible sites which would provide convenient access to the anchorage. One site is along the Lagoon Pond side of Beach Road in the vicinity of the State launching ramp and the other on the west shore of Lagoon Pond near the business center of Vineyard Haven.

ESTIMATE OF BENEFITS

30. No commercial fishing benefits are expected to result from the channel improvement. Approximately 100 recreational boats are expected to transfer to Lagoon Pond from Vineyard Haven Harbor shortly after improvement, thus alleviating congestion in the latter harbor. Therefore, all craft would benefit to some degree. The total recreational fleet that would benefit from the project consists of 319 existing boats and the prospective fleet of 92 boats.

31. Benefits were computed on the basis of annual net return to the owners if boats were "for hire." Rowboats, of which there are 250, are not included in the benefit evaluation. The net return varies with the type and size of craft, and is expressed in terms of average depreciated value. The ideal return is considered the maximum return that could be obtained with full, unrestricted use of the harbor. For this particular harbor, the ideal net return

varies from 7 percent for the large, deepdraft auxiliary sailing vessels to 12 percent for the smaller outboards and inboards. The present return is less than ideal because of the existing navigation difficulties. The improvement would result in the full, ideal return. The net gain represents an average for all craft; i. e., the boats expected to transfer to Lagoon Pond and the craft remaining in the less congested anchorage of Vineyard Haven Harbor.

32. The existing fleet of 265 craft would benefit in the amount of $6,100 after proper reduction for time spent away on cruise. These benefits are computed as shown on Table I.

33. The 4,000 visiting craft are equivalent to 54 locally-based boats. The net boating season totals 75 days. The benefits would be $3,200 as shown in Table II.

34. The improvement would allow for fleet expansion in the amount of 77 craft, 20 of which would be added shortly after improvement. The benefits to the 20 boats are estimated at $4,600. The remaining 57 boats would be added by straight line growth over the 50-year project life with average annual benefits of $6,800. Benefit computations are shown on Tables III and IV, respectively.

35. The improvement is expected to attract 1,100 additional visiting craft each year, which would be equivalent to 15 locally-based boats. Benefits to these craft would total $1,000 as shown on Table V.

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TABLE I. **BENEFITS TO RECREATIONAL BOATING** 75 day net boating season

HARBOR: Lagoon Pond, Mass. (Locally Based Fleet)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% OF IDEAL Pres.	% OF IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
RECREATIONAL FLEET															
Outboards	10-20	100	500	50,000	12	95	100	0.6	300	-	-	-			
Inboards	10-20	50	1,500	75,000	12	95	100	0.6	450	-	-	-			
Cruisers	15-30	25	3,000	75,000	8	90	100	0.8	600	12	10	60			
	31-50	7	6,000	42,000	8	85	100	1.2	500	18	15	75			
	51-60	--	---	---											
Aux. Sail	15-30	10	5,000	50,000	8	90	100	0.8	400	12	10	40			
	31-40	12	20,000	240,000	8	85	100	1.2	2,880	18	15	430			
	41-60	1	100,000	100,000	7	85	100	1.1	1,100	30	25	275			
Sailboats	10-20	30	1,500	45,000	11	95	100	0.6	270	6	5	15			
	21-30	30	2,000	60,000	10	90	100	1.0	600	12	10	60			
	31-40	--	---	---											
	41-60	--	---	---											
CHARTER BOATS															
TOTALS		265		$737,000					$7,100			$955			

$7,100 - $955 = $6,145 Say $6,100

TABLE II. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (Existing Equivalent Transient Fleet)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% OF IDEAL Pres.	% OF IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTA VALU
RECREATIONAL FLEET															
Outboards	10-20	16	500	8,000	12	95	100	0.6	50	-	-	-			
Inboards	10-20	3	1,500	4,500	12	95	100	0.6	30	-	-	-			
Cruisers	15-30	10	3,000	30,000	8	90	100	0.8	240	-	-	-			
	31-50	8	12,000	96,000	8	85	100	1.2	1,150	-	-	-			
	51-60	1	30,000	30,000	7	85	100	1.1	330	-	-	-			
Aux. Sail	15-30	8	5,000	40,000	8	90	100	0.8	320	-	-	-			
	31-40	4	15,000	60,000	8	85	100	1.2	720	-	-	-			
	41-60	1	30,000	30,000	7	85	100	1.1	330	-	-	-			
Sailboats	10-20	2	1,500	3,000	11	95	100	0.6	20	-	-	-			
	21-30	1	4,500	4,500	10	90	100	1.0	50	-	-	-			
CHARTER BOATS															
TOTALS		54		$306,000					$3,240			0			

$3,240 - 0 = $3,240 Say $3,200

TABLE III. - BENEFITS TO RECREATIONAL BOATING
(New Boats)

HARBOR: Lagoon Pond, Mass.

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% OF IDEAL Pres.	% OF IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
RECREATIONAL FLEET															
Outboards	10-20	5	500	2,500	12	0	100	12	300	-	-	-			
Inboards	10-20	4	1,500	6,000	12	0	100	12	720	-	-	-			
Cruisers	15-30	3	3,000	9,000	8	0	100	8	720	12	10	70			
	31-50	1	6,000	6,000	8	0	100	8	480	18	15	70			
Aux. Sail	15-30	1	5,000	5,000	8	0	100	8	400	12	10	40			
	31-40	1	20,000	20,000	8	0	100	8	1,600	18	15	240			
Sailboats	10-20	3	1,500	4,500	11	0	100	11	500	6	5	25			
	21-30	2	2,000	4,000	10	0	100	10	400	12	10	40			
CHARTER BOATS															
TOTALS		20		$57,000					$5,120			$485			

$5,120 - $485 = $4,635 Say $4,600

TABLE IV. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (Gradual Growth)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% OF IDEAL Pres.	% OF IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALU
RECREATIONAL FLEET															
Outboards	10-20	15	500	10,000	12	0	100	12	1,200	-	-	-			
Inboards	10-20	11	1,500	22,500	12	0	100	12	2,500	-	-	-			
Cruisers	15-30	7	3,000	30,000	8	0	100	8	2,400	12	10	240			
	31-50	3	6,000	24,000	8	0	100	8	1,920	18	15	290			
	51-60	-	-	-											
Aux. Sail	15-30	3	5,000	20,000	8	0	100	8	1,600	12	10	160			
	31-40	3	20,000	80,000	8	0	100	8	6,400	18	15	960			
	41-60	-	-	-											
Sailboats	10-20	7	1,500	15,000	11	0	100	11	1,650	6	5	85			
	21-30	8	2,000	20,000	10	0	100	10	2,000	12	10	200			
CHARTER BOATS															
TOTALS		57		$221,500					$19,670			$1,935			

$19,670 - $1,935 = $17,700. Av. Ann. eq. =
$17,700 x 0.387 = $6,800

TABLE V. BENEFITS TO RECREATIONAL BOATING

HARBOR: Lagoon Pond, Mass. (Attracted Equivalent Transient Fleet)

TYPE OF CRAFT	LENGTH (feet)	No. of Boats	DEPRECIATED VALUE		PERCENT RETURN				VALUE $	ON CRUISE			DAMAGES ELIMINATED		
			AVERAGE $	TOTAL $	IDEAL	% OF IDEAL Pres.	% OF IDEAL Future	GAIN		AVG. DAYS	% OF SEASON	VALUE $	AVERAGE EXPER.	AVERAGE ELIM.	TOTAL VALUE
RECREATIONAL FLEET															
Outboards	10-20	1	500	500	12	95	100	0.6	-	-	-	-			
Inboards	10-20	1	1,000	1,000	12	95	100	0.6	10	-	-	-			
Cruisers	15-30	3	3,000	9,000	8	90	100	0.8	70	-	-	-			
	31-50	4	4,000	16,000	8	85	100	1.2	190	-	-	-			
	51-60	1	30,000	30,000	7	85	100	1.1	330	-	-	-			
Aux. Sail	15-30	3	5,000	15,000	8	90	100	0.8	120	-	-	-			
	31-40	1	15,000	15,000	8	85	100	1.2	180	-	-	-			
Sailboats	10-20	1	1,500	1,500	11	95	100	0.6	90	-	-	-			
CHARTER BOATS															
TOTALS		15		$88,000					$990			0			

$990 - 0 = $990 Say $1,000

SUMMARY OF ANNUAL BENEFITS

36. Increased Recreational Boating:

Existing locally-based fleet (265)	$6,100
Existing equivalent transient fleet (54)	3,200
New Boats (20)	4,600
Gradual growth (57)	6,800
Attracted equivalent transient fleet (15)	1,000
TOTAL	$21,700

SHORELINE CHANGES

37. The disposal of the dredged material, which would be placed on the beach east of the proposed jetty, would result in a seaward positioning of the shoreline. The grain size of the material and the characteristics of the attacking waves would determine the eventual slope of the beach.

REQUIRED AIDS TO NAVIGATION

38. The United States Coast Guard has been consulted in regard to establishing aids to navigation for the plan of improvement. In a letter dated 29 December 1967 (Appendix B), the Coast Guard advised that no aids to navigation will be required for the project.

ESTIMATES OF FIRST COSTS

39. An estimate of first cost for construction of the proposed plan of improvement has been made on the basis of soundings, probings and borings taken during December 1966. The materials to be dredged would be primarily a gravelly sand. Unit prices are based on prices prevailing in March 1968, and on the removal of the material by hydraulic methods with spoil disposal on adjacent beaches. Dredging quantities are in terms of in place measurement and provide for dredging to depths 8 feet below mean low water plus an allowance for one-foot overdepth with side slopes one vertical to three horizontal.

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PROJECT COST ESTIMATE

Cost Acct. No.	Item	Estimated Cost (Mar. 1968 Prices)
09	Dredging (ordinary materials) 19,000 c.y. @ $3.00	$57,000
20	Structures	
	Jetty extension 4,500 tons @ $13	58,500
		$115,500
	Contingencies	17,500
		$133,000
	Engineering and Design	13,000
	Supervision & Administration	14,000
		*$160,000

*Exclusive of $18,200 for project study costs.

APPORTIONMENT OF COSTS AMONG INTERESTS

40. The first cost of construction of the proposed improvement has been apportioned between Federal and non-Federal interests in proportion to the general and local benefits derived. The benefits to be derived from improvements at Lagoon Pond are entirely recreational in nature. The costs, therefore, are apportioned 50 percent Federal and 50 percent non-Federal.

Summary of Apportioned Cost:

Federal	
Corps of Engineers	$80,000
Non-Federal	
Cash Contribution	$80,000
Public Landing	10,000*
Total Non-Federal Cost	$90,000

*Self-liquidating

ESTIMATE OF ANNUAL CHARGES

41. The annual charges for the improvement have been computed using a project life of 50 years and an interest rate of 3-1/4 percent for both Federal and non-Federal charges. Maintenance costs for dredging the channel are based on experience with the existing Federal project in Vineyard Haven Harbor and similar conditions. An allowance of 1,000 cubic yards of dredging per year in the Federal project has been made. Maintenance costs of the breakwater are based on experience with similar structures under comparable conditions. The investment and annual charges for the improvements are shown below:

Federal Annual Charges

Interest and amortization (.04073 x $80,000) =	$3,250
Maintenance Channel Dredging 1,000 c.y. @ $3.00 =	3,000
Maintenance of Jetty =	1,000
Total Federal Annual Charges	$7,250

Non-Federal Annual Charges

Interest and amortization (.04073 x $80,000) =	$3,250
Total Federal and Non-Federal Annual Charges	$10,500

COMPARISON OF BENEFITS AND COSTS

42. A comparison of the estimated annual benefits totaling $21,700 and annual charges of $10,500 indicates a benefit-cost ratio of 2.1 to 1.

OPERATION AND MAINTENANCE

43. Maintenance of the channel and jetty will be the responsibility of the United States. All other facilities will be maintained and operated by local interests. It is estimated that periodic dredging will be required every 10 years. The annual cost for maintenance dredging of the channel and for repairs to the jetty is estimated at $3,000 and $1,000, respectively.

48. This plan of improvement would provide the additional space for small craft that is so vitally needed. The resulting benefits to recreational boating would yield a ratio of annual benefits to annual costs of 2.1 to 1. Local interests have indicated that the improvement would meet their needs, and that the required local cooperation would be met. All agencies known to be interested have been consulted and have expressed no objection to the improvement.

RECOMMENDATION

49. The Division Engineer recommends that a Federal navigation project at Lagoon Pond, Tisbury, Martha's Vineyard, Massachusetts be authorized under provisions of Section 107 of the River and Harbor Act of 1960 as amended in 1965. The project would provide an entrance channel 8 feet deep, 100 feet wide from deep water in Vineyard Haven Harbor leading into the natural deep water anchorage in Lagoon Pond and seaward extension of the existing jetty at the entrance for a distance of 200 feet. The total project cost is currently estimated to be $160,000. Annual maintenance costs are estimated at $4,000 for the channel and jetty. In view of the local nature of the recreational benefits, local interests should be required to contribute toward the cost of the project. The recommendation is made subject to the conditions that local interests:

a. Provide a cash contribution of 50 percent of the project construction cost, currently estimated at $80,000.

b. Assume full responsibility for all project costs in excess of the $500,000 Corps of Engineers' limitation under Section 107 of the 1960 River and Harbor Act, as amended.

c. Provide, maintain and operate a public landing with berths commensurate with channel depth, and provide and maintain necessary access roads, parking areas and other public use facilities open to all on equal terms.

d. Hold and save the United States free from damages which may result from construction and maintenance of the project.

e. Provide without cost to the United States all lands, easements and rights-of-way required for construction and subsequent

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maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of spoil, and also the necessary retaining dikes, bulkheads and embankments therefor or the cost of such retaining works.

f. Regulate the use, growth and development of the harbor facilities with the understanding that they will be open to all on equal terms.

g. Establish regulations prohibiting discharge of untreated sewage, garbage and other pollutants in the waters of Lagoon Pond by users thereof, which regulations shall be in accordance with applicable laws or regulations of Federal, State and local authorities responsible for pollution prevention control.

4 Incl
1. Maps - 2 Plates
2. Appendix A - Comments of Federal Agencies
3. Appendix B - U. S. Coast Guard Report
4. Appendix C - Letters by Local Interests

REMI O. RENIER
Colonel, Corps of Engineers
Division Engineer